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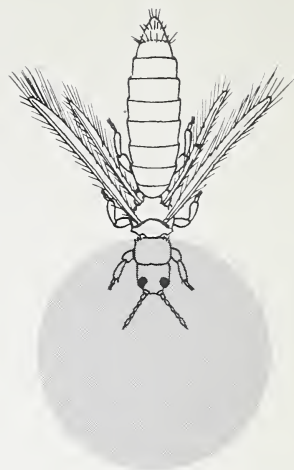


THRIPS on cotton

HOW TO CONTROL THEM

THRIPS ON COTTON

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Thrips are tiny, winged insects that injure plants by feeding on their juices. Several species of thrips attack cotton plants.¹ Most common of these are the flower thrips and their closely related species, tobacco thrips and onion thrips. Two or more species may be found in the same cottonfield, often on the same plant, although one species usually predominates in a population.

Thrips are found on cotton in all the major cotton-producing States. Some species, such as onion thrips and *Frankliniella exigua*, occur across the entire Cotton Belt. Tobacco thrips are confined to approximately the eastern half of the United States; *F. occidentalis* occurs in the western half. The latter two species overlap in occurrence in western Oklahoma and in slightly more than the central third of Texas.

¹ *Frankliniella exigua*; *F. fusca* (tobacco); *F. gossypiana*; *F. occidentalis*; *F. tritici* (flower); *Thrips tabaci* (onion); and *Sericothrips variabilis*.

Tobacco thrips usually are predominant on seedling plants; other species may become more numerous on plants beyond the seedling stage of growth. Onion thrips rarely cause serious injury to cotton in the eastern part of the Cotton Belt, except where onions are grown near cotton.

The duration and intensity of thrips infestations vary greatly in different seasons and locations. Experience is the best guide in predicting damage to cotton in an area.

DEVELOPMENT

Thrips develop in four life stages—egg, larva, pupa, and adult. Female adults lay their eggs in the tender tissues of plants. Eggs are creamy white and minute—about $\frac{1}{100}$ inch long.

In about 4 days, the eggs hatch into tiny, white larvae. The larvae feed for about 6 days, during which time they shed their skins twice. Then they burrow into the soil and transform into pupae. The pupae

transform into adults and emerge from the soil in about 4 days.

Adult thrips may be yellow, brown, or black, depending on the species. They are slender and about $\frac{1}{16}$ inch long. They have two pairs of fringed wings, and fly from plant to plant and from field to field.

Thrips complete a generation in about 2 weeks, and produce many generations in a year. In southern areas, they breed all year on various host plants. In other areas, they pass the winter in plant residues, and resume the life cycle when hosts become available in spring.

DAMAGE

Both the larvae and the adults of thrips damage cotton plants. They pierce the leaf tissues with their sharp mouth parts, and suck out the juices.

These insects injure cotton seedlings, and may also injure older plants. They attack leaves and terminal buds. Severely infested young plants may die, and the

stand may be destroyed or reduced to the point where the crop must be replanted. This condition may occur when heavily infested onions, growing near cotton, are harvested.

Heavy feeding on cotyledons gives the plants a silvery appearance. A field of severely injured young cotton may appear to have been scorched by fire.

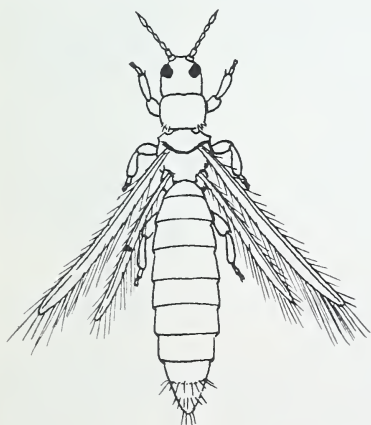
Thrips injury to leaf tissue in terminal buds results in ragged, crinkled leaves that curl upward. (Aphid injury would cause leaves to turn downward.) The terminal buds may be killed; when this occurs, new buds develop, and the plant becomes distorted and excessively branched.

Infestations usually abate after cotton plants are 4 to 6 weeks old. The plants recover from the injury, but those that are severely injured may continue to shed squares for a week or more after recovery seems apparent.

If a light infestation occurs on seedling cotton and does not destroy the stand, it may retard plant growth and delay fruiting and maturing of the crop. The same is true if a light infestation attacks cotton that has progressed beyond the seedling stage. In some western cotton-growing areas, cotton in the late-season stage of growth is sometimes severely attacked by thrips.

Thrips attack many wild and cultivated host plants. Large numbers of adults migrate to cottonfields in spring and early summer after other host plants begin to mature.

The abundance of thrips, extent of their damage, and need for their



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Adult thrips, greatly enlarged.

control vary greatly in different years and areas. Thrips may retard seedling growth and delay fruiting. They may be responsible for reduction in yield where droughts in late summer limit production or where boll weevils, bollworms, or pink bollworms are prevalent.

CONTROL

Some States do not generally recommend thrips control. In these States, experience has shown that thrips usually do not affect final yields of cotton. In some areas of other States, thrips may be an annual problem and final yields may be reduced. In these areas, applying insecticide is the only practical way of controlling the pests.

Determining Need for Insecticide

Adult thrips migrate to cotton when other host plants begin to mature, particularly during dry weather in late spring and early summer. This is the time to start looking for them. Inspect your plants to determine whether an insecticide should be applied. Make the first inspection as soon as the plants emerge to a stand. Repeat inspections at least once a week until plants are 4 to 6 weeks old.

How to make an inspection.—Walk diagonally across the field; examine the plants at close intervals. On seedling plants, insecticide is needed if the unfolding leaves are brownish, if there is some silvering of the undersides of cotyledons, and if adult thrips are present. On older plants, insecticide is needed if the newest leaves show browning

along their edges, if there is silvering on the undersides of leaves, and if adult thrips are plentiful.

It takes fewer thrips to injure young plants. If you find it difficult to see thrips on a plant, you may dislodge and easily see them by pulling up the plant and tapping it against a sheet of paper.

Applying Insecticide

Effective insecticides for controlling thrips are available in either dusts or sprays. Sprays are usually more practical and more economical under early-season conditions. Insecticides usually give good control when applied at weekly intervals. When thrips migrations are heavy, treatments at 5-day intervals may be required.

RESISTANCE

In the High Plains of Texas and in New Mexico, several of the chlorinated hydrocarbon insecticides have been considerably less effective against thrips than they have been in other areas. Apparently, the insects have developed a degree of resistance to these insecticides in these areas. If such resistance occurs in your area, use one of the organic phosphorus compounds, or use a mixture of a phosphorus compound and a chlorinated hydrocarbon, or use Sevin.

Dusts

If you use a dust, apply one of the following at the rate of 10 pounds per acre, at these commonly formulated strengths: aldrin, 2.5 percent ;

BHC (gamma isomer), 2 percent; DDT, 5 percent; dieldrin, 1.5 percent; endrin, 1.5 percent; Guthion, 2.5 percent; heptachlor, 2.5 percent; malathion, 5 percent; Sevin, 7.5 percent; Strobane, 10 percent; or toxaphene, 10 percent.

If spider mites are likely to be a problem in your area, apply a dust containing either (1) 40 percent or more of sulfur, or (2) some other suitable miticide in the amount recommended by your State guide for controlling cotton insects. Application of a miticide may not be necessary if you use Guthion or malathion for control of thrips. Either of these insecticides is effective against several species of spider mites.

If you apply dust with a ground machine, set the nozzles 4 to 6 inches above the plants.

If you apply dust with an air-

plane, increase the rate of application to 15 pounds per acre. Limit the swath widths to the width of the plane's wings; flag or mark the swaths to insure thorough coverage.

Dust applications usually are more effective if made in early morning or late afternoon. Do not apply a dust when wind velocity exceeds 5 miles an hour.

Sprays

If you use a spray, prepare it from one of the insecticide concentrates listed in the accompanying table. Mix the concentrate with enough water to give the proper dosage. The amount of water needed depends on the rate of output of your spray machine. For example, if the machine has an output rate of 3 gallons per acre, and 2 pints of concentrate per acre are required to give control, add 2 pints



BN-15400

Cotton plant injured by thrips. Note abnormal branching.

of concentrate to each $2\frac{3}{4}$ gallons of water to make 3 gallons of total spray.

To prevent runoff, apply sprays only when the plants are dry.

If you apply spray with a ground machine, use one cone nozzle for each row; set nozzles 6 to 9 inches above the tops of the plants. Apply 2 to 3 gallons of spray per acre, at 60 pounds pressure. With ground machines, sprays can be applied

effectively in winds up to 15 miles an hour.

If you apply spray with an airplane, increase the per-acre amount of the emulsifiable concentrate or wettable powder at least 50 percent. Limit swath widths to the wingspan of the plane. Flag or mark the swaths to insure thorough coverage. Do not apply spray with an airplane when wind velocity exceeds 8 miles an hour.

Insecticide concentrates for preparing sprays to control thrips on cotton, and rates at which they are applied

Insecticide concentrate, and formulation	Amount of concentrate to be added to water to treat 1 acre
Chlorinated hydrocarbons	
<i>Emulsifiable concentrates</i>	
Aldrin, 2 pounds per gallon.....	<i>Pints</i> $\frac{1}{3}$ to $\frac{2}{3}$
BHC (gamma isomer), 1.2 pounds per gallon.....	1.0 to $1\frac{1}{3}$
DDT, 2 pounds per gallon.....	$\frac{2}{3}$ to 2
Dieldrin, 1.5 pounds per gallon.....	$\frac{1}{4}$ to $2\frac{2}{3}$
Endrin, 1.6 pounds per gallon.....	$\frac{3}{8}$ to $1\frac{1}{2}$
Heptachlor, 2 pounds per gallon.....	$\frac{1}{3}$ to $\frac{2}{3}$
Strobane, 6 pounds per gallon.....	1.0 to 3
Toxaphene, 6 pounds per gallon.....	1.0 to 3
Organic phosphorus compounds¹	
<i>Emulsifiable concentrates</i>	
Guthion, 2 pounds per gallon.....	$\frac{1}{3}$ to 1
Malathion, 5 pounds per gallon.....	$\frac{1}{3}$ to $1\frac{1}{3}$
Carbamate	
<i>Wettable powder concentrate</i>	
Sevin, 80 percent.....	<i>Pounds</i> $\frac{3}{8}$ to $1\frac{1}{4}$

¹ Methyl parathion and parathion also are effective against thrips but are not generally recommended because their residual toxicity does not last as long as that of insecticides commonly used for thrips control.

CONTROLLING THRIPS PLUS OTHER INSECTS

In some areas, thrips are only one of the insects that attack cotton early in the season. Thrips usually make their appearance a week or two in advance of other pests such as cotton fleahoppers and overwintered boll weevils. The thrips may continue to occur with these other pests in combination infestations.

It is important to regulate your insecticide program so it will start with the occurrence of thrips and carry over to control all the pests that may come later. If you do not provide this carryover, the pests that appear later may offset the benefits you achieved from your early thrips control.

If your plants are threatened by

cutworms, cotton fleahoppers, or overwintered boll weevils, apply any of the insecticides recommended by your State to control these pests. Usually, you can control all early-season pests, including thrips, if you (1) make your plantings at the normal time for your area, and (2) make three or four applications of a recommended insecticide at weekly intervals, beginning when plants are at the four-leaf stage of growth. However, when thrips control is needed earlier, a dosage to control these insects should be applied in the first two applications. A dosage to control boll weevils should be used in later applications.

PRECAUTIONS

Insecticides discussed in this publication are poisonous to man and animals. Follow directions and



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Seedling cotton plant injured by thrips.

heed all precautions on container labels.

If you get insecticide on your skin or clothing, remove clothing and bathe with soap and water. As soon as you have finished using insecticide, bathe and change clothing.

Do not open insecticide containers in closed rooms. Do not leave metal containers of emulsifiable concentrates in the sun.

Empty containers are particularly hazardous. Empty bags should be burned *in the open*, or buried. Liquid containers should be crushed and buried.

Do not apply insecticides where they can drift onto pastures being grazed by livestock. Dusts are particularly dangerous in this respect.

Protect food and feed crops from the drift of insecticides being applied for the control of thrips and other cotton insects.

Avoid killing honey bees and other pollinating insects; make insecticide applications, if possible, during hours when bees are not visiting the plants. Take precautions against drift of insecticides into bee yards and adjacent crops in bloom. Notify beekeepers at least 48 hours before dusting or spraying, so measures can be taken to protect the bees.

To protect fish and wildlife, be careful not to contaminate streams, lakes, or ponds with insecticide. Do not clean spraying equipment, or empty excess spray material, near such water.

The Extension Service in each cotton-producing State issues an annual guide for controlling cotton insects. You can get a copy at your county agricultural agent's office. If you are in doubt about the kind of cotton-insect control program to follow, consult your county agent.

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